

## SELF-DEPLOYING SAFETY BRACE SPRING

### CROSS-REFERENCE TO RELATED APPLICATION

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This application is co-pending with a Utility Application, assigned Navy Case No. 84848, which was concurrently filed.

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### STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

The invention described herein may be manufactured and used by or for the government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

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### FIELD OF THE INVENTION

The present invention relates to safety braces for hinged items. In particular the present invention relates to an apparatus and a method to prevent the untimely closure of a hinged item including a scuttle lid.

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### BACKGROUND OF THE INVENTION

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Many items are constructed with hinged members such as folding tables, doors, covers and lids. Many of these items are constructed to include some kind of safety feature, which will lock or prop the items in an open position so that they will not fold at an inopportune time and collapse.

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A brace or prop safety feature is especially important in the case of horizontal doors, lids or covers. This is due to fact that these doors or covers can be weighty and are often used by persons for ingress and egress from an area or space. The safety features on these hinged items are important to prevent a weighty door or cover from closing on a person, thereby injuring them.

The brace or prop is mounted on the door or cover in such a way as to impede the

motion of the door when the brace is engaged. But in situations when there is movement or vibration in the environment around the door or cover, a brace or prop can be shaken loose, thus allowing the door or cover to close and fall unexpectedly. This situation occurs frequently in the case of scuttle lids on board ships. Often the scuttle lid safety brace  
5 arrangement is susceptible to being shaken out of position by the movement of the ship or other vibrations. In addition, the safety brace may be accidentally bumped by personnel. Scuttle lids have been tied in place and pieces of wood have been placed between the scuttle lid hinges and the safety brace to prevent the lid from closing. Albeit inexpensive, these measures result in a substantial time delay in closing the lid when required and can pose a  
10 safety threat.

There are covers commercially available constructed with internal torsional springs or other means to prevent the safety braces from being shaken loose. But there currently exists an immense number of hinged cover, door or lid configurations, especially on board ships. It would be prohibitive to replace every one of these with newer, safer products, both  
15 from the standpoint of cost and time out of service.

Accordingly, there is a need for an economical and easy modification and retrofit of existing safety braces to prevent covers, doors or lids from being shaken loose, thereby preventing injuries from the hinged items closing on persons unexpectedly, especially on board ships.

20 Additional advantages and novel features of the invention will be set forth in part in the description which follows, and in part will become apparent to those skilled in the art upon examination of the following or may be learned by practice of the invention. The objects and advantages of the invention may be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

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#### BRIEF SUMMARY OF THE INVENTION

The present invention relates to an apparatus to keep a safety brace in place on a cover, lid or door and a method of using the same. One aspect of the present invention includes an economical spring constructed to fit upon a safety brace in a way as to  
30 prevent the brace from being vibrated loose and allowing the cover, lid or door to close

accidentally. Another aspect of the present invention is a method where the constructed spring is retrofitted upon an existing safety brace.

An embodiment of an aspect of the present invention is a biasing device for a scuttle lid safety brace assembly which comprises a spring mounted on the safety brace wherein the safety brace includes a plurality of linkages hingedly coupled to one another. The spring has a first, second and third section that are fixed to one another. The first section has an elongated first leg dimensioned and configured to exert a first force against the scuttle lid. The second section has a plurality of coils with each coil having an inside diameter dimensioned and configured to slidably fit upon a hinge means operably coupling the safety brace to the scuttle lid. The coils are spaced apart and coupled by an intermediate member fixed to each of the coils and is dimensioned and configured to exert a second force against the safety brace linkages. The third section has an elongated second leg dimensioned and configured to exert a third force against the scuttle lid. The legs and the intermediate member apply each force to rotatively bias the linkages of the safety brace against the scuttle lid, forcing the safety brace to remain folded in the direction, preventing the scuttle lid from closing.

Another embodiment of an aspect of the present invention is a biasing device for a scuttle lid safety brace assembly which comprises a spring mounted on the safety brace wherein the safety brace includes a plurality of linkages hingedly coupled to one another. The spring has a first, second and third section that are fixed to one another. The first section has an elongated first leg dimensioned and configured to exert a first force against the scuttle lid. The second section has a plurality of coils with each coil having an inside diameter dimensioned and configured to slidably fit upon a hinge means operably coupling the safety brace to the scuttle lid. The third section has an elongated second leg dimensioned and configured to exert a second force against the linkages of the safety brace. The legs apply each force to rotatively bias the linkages of the safety brace against said scuttle lid, forcing the safety brace to remain folded in the direction, preventing the scuttle lid from closing.

It has been found desirable to comprise the spring of a unitary structure of about 0.09 inch diameter 304 stainless steel. In particular, the second force is about 40 inch-pounds, with a static angle of about 145 degrees.

Another aspect of the present invention includes a method for rotatively biasing a safety brace on a scuttle lid thereby preventing the lid from closing including: providing a scuttle lid having a safety brace attached by a hinge pin and providing a biasing device including: a spring mounted on the safety brace having a first, second and third sections that are fixed to one another, the first section having an elongated first leg dimensioned and configured to exert a first force against the scuttle lid, the second section which has a plurality of coils each having an inside diameter dimensioned and configured to slidably fit upon the hinge means that is operably coupling the safety brace to the scuttle lid, each coil spaced apart and coupled by an intermediate member dimensioned and configured to exert a second force against the safety brace, the third section having an elongated second leg also dimensioned and configured to exert a third force against the scuttle lid, rotatively biasing the safety brace linkages relative to the scuttle lid in that the safety brace is biased to remain folded in the direction preventing the scuttle lid from closing. Subsequently, removing the hinge pin and replacing it with a hinging means, including a bolt, dimensioned and configured to slide within the coils of the spring and at the same time coupling the safety brace to the scuttle lid. The spring is secured to the hinge means by washers and a fastener including a nut or a cotter pin. The spring is positioned so that it rotatively biases the safety brace so that it cannot unfold away from the scuttle lid, thereby preventing the lid from closing until operated by personnel.

Another embodiment of this aspect of the present invention includes a method for rotatively biasing a safety brace on a scuttle lid thereby preventing the lid from closing including: providing a scuttle lid having a safety brace attached by a hinge pin and providing a biasing device including: a spring mounted on the safety brace having a first, second and third sections that are fixed to one another, the first section having an elongated first leg dimensioned and configured to exert a first force against the scuttle lid, the second section which has at least one coil having an inside diameter dimensioned and configured to slidably fit upon the hinge means that is operably coupling the safety brace to the scuttle lid, the third section having an elongated second leg also dimensioned and configured to exert a second force against the safety brace linkages, rotatively biasing the safety brace linkages relative to the scuttle lid in that the safety brace is biased to remain folded in the direction preventing the scuttle lid from closing. Subsequently, removing

the hinge pin and replacing it with a hinging means, including a bolt, dimensioned and configured to slide within the coils of the spring and at the same time coupling the safety brace to the scuttle lid. The spring is secured to the hinge means by washers and a fastener including a nut or a cotter pin. The spring is positioned so that it rotatively  
5 biases the safety brace so that it cannot unfold away from the scuttle lid, thereby preventing the lid from closing until operated by personnel.

The device and method of the present invention is of simple construction and implementation, with the ability to be easily retrofitted entirely externally without requiring welding or other labor intensive installation by personnel, and without a significant out of  
10 service time.

Still other advantages of the present invention will become readily apparent to those skilled in this art from the following detailed description. As will be realized, the invention is capable of other and different embodiments, and its several details are capable of modifications in various obvious respects, all without departing from the invention.  
15 Accordingly, the drawings and description are to be regarded as illustrative in nature, and not as restrictive.

#### BRIEF DESCRIPTION OF THE DRAWINGS

20 **FIG.1** is a perspective view of an embodiment of the present invention showing an installed spring in a scuttle lid assembly.

**FIG. 2** is a front view of an embodiment of the present invention showing an installed spring in a scuttle lid assembly.

**FIG. 3** is a perspective view of another embodiment of the present invention showing an  
25 installed spring in a scuttle lid assembly.

**FIG. 4** is a front view of another embodiment of the present invention showing an installed spring in a scuttle lid assembly.

**FIG. 5** is a side view illustrating an example of one embodiment of the present invention showing the static angle of the spring.

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## DETAILED DESCRIPTION OF THE EMBODIMENTS OF THE INVENTION

Before explaining the disclosed embodiment of the present invention in detail it is to be understood that the invention is not limited in its application to the details of the particular arrangement shown since the invention is capable of other embodiments. Also,  
5 the terminology used herein is for the purpose of description and not of limitation.

The present invention relates to an apparatus to keep a safety brace in place on a cover, lid or door and a method of using the same. One aspect of the present invention includes an economical spring constructed to fit upon a safety brace in a way as to prevent the brace from being vibrated loose and allowing the cover, lid or door to close  
10 accidentally. Another aspect of the present invention is a method where the constructed spring is retrofitted upon an existing safety brace.

Referring to the drawings, wherein like reference numerals represent like parts throughout, referring to **FIG. 1**, reference numeral **10** is directed to one aspect of the present invention which includes a scuttle lid assembly having a safety brace **140**. The  
15 scuttle lid assembly **10** includes a scuttle lid **100**, the lid hinges **120** and a hinged safety brace **140**. The safety brace **140** is constructed of a pair of linkages. The linkages are hingedly coupled so that the safety brace **140** folds only partially in the direction of the scuttle lid **100**. When the safety brace **140** is folded inwardly toward the scuttle lid **100** (the position shown in FIG.1) the inability of the linkages to fold any farther inward  
20 prevents the closing of the scuttle lid **100**, in the absence of vibration or jostling.

Mounted on the safety brace **140** and the scuttle lid **100** is an aspect of the present invention, a torsional spring **160**. The spring **160** includes elongated legs **162** each extending from one end of the coils **164** of the spring **160** that exert first and third forces against the scuttle lid **100**. The coils **160** are spaced apart and coupled by an intermediate  
25 member **166**. The intermediate member **166** being dimensioned so as to fit around and exert a second force against the safety brace **140**. This force rotatively biases the safety brace **140** toward the scuttle lid so that the safety brace **140** is prevented from unfolding away from the scuttle lid **100** and allowing the scuttle lid **100** to close. The spring **160** being constructed in that the forces are sufficient to prevent the safety brace **140** from  
30 inadvertently unfolding but not so much as to prevent a person from overcoming the force and closing the lid as desired.

Referring to **FIG. 2**, the spring **160** of an embodiment of the present invention, elongated legs **162**, coils **164** and intermediate member **166** is shown in a front view. The spring coils **164** slidably fit upon the bolt **170** coupling the safety brace **140** to the scuttle lid **100** and in another embodiment of the present invention is secured by washers **172** and a cotter pin **176**. (Alternate ways to secure the spring in place on the bolt are also used, including a nut, in lieu of the cotter pin.) The spring will be easily retrofitted to existing scuttle lids by ship's personnel while underway, thereby eliminating the need to replace the scuttle lid assembly for safety reasons prior to the end of its useful life. It is noteworthy that the dimensions and material of the spring of the present invention are changed in order to exert sufficient force on the safety braces for lids of various sizes.

Referring to **FIG. 3**, a perspective view of another embodiment of the present invention, reference numeral **20** is directed to a scuttle lid assembly including a safety brace. The scuttle lid assembly **20** includes a scuttle lid **200**, the lid hinges **220** and a hinged safety brace **240**. Mounted on the safety brace **240** and the scuttle lid **200** is a torsional spring **260** of another embodiment of the present invention. The spring coil **264** slidably fits upon the bolt **270** coupling the safety brace **240** to the scuttle lid **200** and in another embodiment of the present invention is secured by washers **272** and a nut **274**. The spring **260** includes an elongated leg **262** extending from one end of the coil **264** of the spring **260** that exerts a first force against the scuttle lid **200**. The spring includes a second elongated leg **266** dimensioned so as to fit around and exert a second force against the safety brace linkages. This force rotatively biases the safety brace **240** toward the scuttle lid **200** so that the safety brace **240** is prevented from unfolding away from the scuttle lid **200** and allowing the scuttle lid **200** to close. The spring **260** being constructed in that the force is sufficient to prevent the safety brace **240** from inadvertently unfolding but not so much as to prevent a person from overcoming the force and closing the lid as desired. The spring **260** of this embodiment is economical, utilizing less material and manufacturing time.

Referring to **FIG. 4**, a front view of another embodiment of the present invention, reference numeral **20** is directed to a scuttle lid assembly including a safety brace. The scuttle lid assembly **20** includes a scuttle lid **200**, the lid hinges **220**, a hinged safety brace **240**, a spring **260**, elongated leg **262**, and a second elongated leg **266** as previously

described in **FIG. 3**. The spring coil **264** slidably fits upon the bolt **270** coupling the safety brace **240** to the scuttle lid **200** and in another embodiment of the present invention is secured by washers **272** and a cotter pin **276**.

**FIG. 5** illustrates an example of an embodiment of the present invention including a  
5 spring **160** constructed to have a static angle of about 145 degrees between the elongated  
legs **162** and the intermediate member **166** after forming, winding and normalization is  
complete. The spring **160** is installed on the safety brace **140** as shown in **FIGS. 1** and **2** so  
that the spring coils **164** are positioned on either side of the safety brace **140** and on a hinge  
bolt **170** or pin of sufficient length to accommodate the coils and secured in place by  
10 washers **172** and a nut or cotter pin **176**. For example, a spring formed of about 0.09 inch  
diameter, 304 stainless steel wire which is normalized after forming, installed on a safety  
brace that is propping open an about 21 inch diameter horizontally mounted scuttle lid  
weighing about 90 pounds. In the example, the spring exerts a force of about 40 inch-  
pounds, rotatively biasing the safety brace in such a way that the safety brace cannot fold  
15 away from the scuttle lid without intervention by personnel. Other examples include the  
spring being easily retrofitted on scuttle lids by personnel while a ship is on normal  
operations.

Another aspect of the present invention includes a method for rotatively biasing a  
safety brace on a scuttle lid thereby preventing the lid from closing including: providing a  
20 scuttle lid having a safety brace attached by a hinge pin and providing a biasing device  
including: a spring mounted on the safety brace having a first, second and third sections  
that are fixed to one another, the first section having an elongated first leg dimensioned  
and configured to exert a first force against the scuttle lid, the second section which has a  
plurality of coils each having an inside diameter dimensioned and configured to slidably  
25 fit upon the hinge means that is operably coupling the safety brace to the scuttle lid, each  
coil spaced apart and coupled by an intermediate member dimensioned and configured to  
exert a second force against the safety brace, the third section having an elongated second  
leg also dimensioned and configured to exert a third force against the scuttle lid,  
rotatively biasing the safety brace linkages relative to the scuttle lid in that the safety  
30 brace is biased to remain folded in the direction preventing the scuttle lid from closing.  
Subsequently, removing the hinge pin and replacing it with a hinging means, including a



bolt, dimensioned and configured to slide within the coils of the spring and at the same time coupling the safety brace to the scuttle lid. The spring is secured to the hinge means by washers and a fastener including a nut or a cotter pin. The spring is positioned so that it rotatively biases the safety brace so that it cannot unfold away from the scuttle lid,

5 thereby preventing the lid from closing until operated by personnel.

Another embodiment of this aspect of the present invention includes a method for rotatively biasing a safety brace on a scuttle lid thereby preventing the lid from closing including: providing a scuttle lid having a safety brace attached by a hinge pin and providing a biasing device including: a spring mounted on the safety brace having a first, 10 second and third sections that are fixed to one another, the first section having an elongated first leg dimensioned and configured to exert a first force against the scuttle lid, the second section which has at least one coil having an inside diameter dimensioned and configured to slidably fit upon the hinge means that is operably coupling the safety brace to the scuttle lid, the third section having an elongated second leg also dimensioned and 15 configured to exert a second force against the safety brace linkages, rotatively biasing the safety brace linkages relative to the scuttle lid in that the safety brace is biased to remain folded in the direction preventing the scuttle lid from closing. Subsequently, removing the hinge pin and replacing it with a hinging means, including a bolt, dimensioned and configured to slide within the coils of the spring and at the same time coupling the safety 20 brace to the scuttle lid. The spring is secured to the hinge means by washers and a fastener including a nut or a cotter pin. The spring is positioned so that it rotatively biases the safety brace so that it cannot unfold away from the scuttle lid, thereby preventing the lid from closing until operated by personnel.

Although the description above contains much specificity, this should not be 25 construed as limiting the scope of the invention but as merely providing an illustration of the presently preferred embodiment of the invention. Thus the scope of this invention should be determined by the appended claims and their legal equivalents.